

CLAIMS

1 1. An isolated and purified nucleic acid molecule coding for a protein having a potassium (K⁺)
2 permeable membrane, comprising more than one P domains and three, four, five or more than six
3 transmembrane segments.

1 2. The nucleic acid molecule of claim 1 coding for a protein wherein the number of P domains
2 is two and the number of transmembrane segments is four.

1 3. The nucleic acid molecule of claim 1 which is human.

1 4. The nucleic acid molecule of claim 1 which is a cDNA copy of a 2.6 kilobase transcript
2 expressed at high levels in the pancreas and placenta, and at lower levels in the brain, lung, prostate, heart,
3 kidney, uterus small intestine and colon.

1 5. The nucleic acid sequence of claim 1 which codes for a protein which comprises the
2 sequence represented by SEQ ID No. 4.

1 6. The isolated and purified nucleic acid sequence of claim 1 which codes for a protein which
2 comprises the sequence represented by SEQ ID No. 4 or the functionally equivalent sequence thereof which
3 comprises two P domains and four transmembrane segments.

1 7. An isolated and purified nucleic acid sequence of claim 2 which comprises our open reading
2 frame (ORF) of 1185 nucleotides.

1 8. The isolated and purified nucleic acid sequence of claim 7 which is human.

1 9. An isolated and purified protein having a potassium (K⁺) permeable membrane comprising
2 more than one P domain and three, four, five or more than six transmembrane segments.

1 10. The protein of claim 9 wherein the number of P domains is two and the number of
2 transmembrane segments is four.

1 11. The protein of claim 10 in which the potassium transport channel exhibits outward
2 rectification when the extracellular concentration of potassium is 2mM and no rectification when the
3 extracellular potassium is 98mM, thereby evidencing lack of intrinsic voltage sensitivity

1 12. The protein of claim 10 in which the potassium transport channel lacks intrinsic voltage,
2 lacks kinetics voltage-and time sensitivities, thereby evidencing characteristics of background conductance.

1 13. The protein of claim 9 in which the activity of the potassium transport channel is regulated
2 by extracellular pH in a physiological range of 6.5 and 7.8.

1 14. The protein of claim 13 which the potassium channel exhibits 10% transport activity at pH
2 6.7, and 90% transport activity at pH 7.7.

1 15. The protein of claim 14 which is human.

1 16. The protein of claim 15 which comprises the sequence represented by SEQ ID No. 4.

1 17. A method of screening for substances capable of modulating the activity of the potassium
2 transport channel encoded by the nucleic acid sequence of claim 1 comprising contacting pre-selected

3 amounts of the substance to be tested with cells expressing the potassium transport channel, measuring the
4 effects of said substance on the transport functions of the potassium transport channel, and identifying the
5 substance that has a positive or negative effect on potassium channel activity .

1 18. A substance, identified by the method of claim 17 that is competent to positively or
2 negatively influence the transport functions of a potassium transport channel.

1 19. A method for identifying genetic polymorphisms in the locus comprising the nucleic acid
2 sequence of claim 1 by hybridizing DNA samples under stringent conditions with a probe comprising the
3 isolated nucleic acid sequence encoding the potassium transport channel.

1 20. The method of claim 19 where the probe is hybridized to intact chromosomes *in situ*.

1 21. The method of claim 20 where the probe is hybridized with Southern blots of genomic
2 DNA digested with a restriction endonuclease.

1 22. The method of claim 17 wherein the nucleic acid sequence encodes a protein in which the
2 potassium transport channel lacks kinetics, voltage-and time-sensitivities, thereby evidencing characteristics
3 of background conductance.

2 23. A substance identified by the method of claim 22 which is competent to positively or
3 negatively influence the transport functions of a potassium transport channel.

1 24. A self replicating vector comprising the nucleic acid molecule of claim 1.

1 25. A cell transformed with the vector of claim 24, which cell is selected from the group

2 consisting of prokaryotes and eukaryotes.

1 26. The transformed cell of claim 25 which is a yeast, insect cell, plant cell or mammalian cell.

1 27. The transformed cell of claim 25 which is a bacteria.

1 28. A method for the expression and isolation of a potassium transport channel encoded by the
2 nucleic acid molecule of claim 1 in a competent host cell comprising transferring the vector of claim 24 into
3 a competent host cell, culturing said host cell under conditions allowing the production of the potassium
4 transport channel, and isolating and purifying the polypeptide comprising the potassium transport channel.

1 29. A transgenic animal which comprises the nucleic acid sequence of claim 1 encoding a
2 potassium transport channel.

1 30. The transgenic animal of claim 29 in which the nucleic acid sequence encoding the
2 potassium transport channel is non-human.

1 31. The transgenic animal of claim 29 which overexpresses the potassium transport channel
2 encoded by the nucleic acid sequence represented by SEQ ID No. 3.

1 32. The transgenic animal of claim 29 which is deficient in the expression of the potassium
2 transport channel encoded by the nucleic acid sequence represented by SEQ ID No. 3.

1 33. A pharmaceutical composition for the treatment of diseases caused by a defective potassium
2 transport or a deficiency of the potassium transport protein comprising the nucleic acid of claim 1 or the
3 transformed cells of claim 25 in one or more tissues having a defective potassium transport function under
4 conditions which allow for the expression of the potassium transport channel in said tissue.